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## ***MASTER OF MILITARY STUDIES***

***Can the Marine Corps Overcome the Obstacles of effectively Supplying the Small Infantry Unit in the 21st Century Urban Conflict?***

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## EXECUTIVE SUMMARY

**Title:** *Can the Marine Corps Overcome the Obstacles of Effectively Supplying the Small Infantry Unit in the 21st Century Urban Conflict?*

**Author:** Major Ricky F. Brown USMC

**Thesis:** Is the Marine Corps' approach to enhancing its urban warfare logistics capabilities valid given the logistics requirements unique to urban warfare?

**Discussion:** Several lessons learned can be drawn from recent modern urban conflicts in Southern Lebanon, Northern Ireland, Chechnya, and Hue City, Viet Nam, which are relevant to logistics support of future U.S. urban operations. These lessons learned, when matched to a logistical functional area, explain why urban warfare is more complicated, unpredictable, and deadly than conventional warfare and why it requires a different focus of logistics support. In looking at factors that contribute to the character of urban warfare, the most prominent are an asymmetric nature, aggravated by man made structures, and the complications inherent in dealing with modern news media, changing rules of engagement, and the presence of non-combatants. The factors also illustrate the need to understand the demands on the supply/transportation systems, and casualty dynamics.

If the Marine Corps is committed to ensuring forward afloat forces can respond to a crisis in the littorals, recognition of factors that contribute to urban warfare's unique character and logistics requirements and capabilities needed, are critical. Actions taken by the Marine Corps to identify tactics, techniques, procedures, and technology that maximize the effects of smaller forces in the urban combat are steps in the right direction. Logistics to support operations in urban warfare, however, must meet today's challenges and remain flexible enough to make adaptations to improve logistics systems when tactics, techniques, procedures, and technologies do not change the burdens on logistics systems.

**Conclusion(s) or Recommendation(s):** Systems to be developed should not depend on depriving the front-line commanders of combat assets, or personnel. Specialized systems should be developed to meet the specialized needs of urban combat service support. These systems could be armored ambulances and refuelers, or could be cost effective unmanned aerial vehicles. These systems should then be matched to appropriate combat service support organizations and missions.

## *Table of Contents*

	<i>Page</i>
INTRODUCTION.....	1
Understanding the Urban Warfare Problem.....	4
IDENTIFICATION OF UNIQUE REQUIREMENTS.....	12
SUPPLY.....	13
Constants.....	13
Food and Water.....	13
Fuel.....	14
Special Equipment.....	14
High Demand Items.....	18
TRANSPORTATION.....	21
Moving Sustainment, Troops, and Equipment.....	21
Vertical Lift Assets.....	23
Wheeled Versus Tracked Vehicles.....	24
Modern Day Mules.....	26
Evacuation of Casualties, Detainees, and Prisoners of War..	27
HEALTH SERVICES.....	30
Increased Lethality Rate.....	30
Contributions to the Overall Casualty Numbers.....	33
ENGINEERING AND SERVICES.....	39
CONCLUSIONS AND RECOMMENDATIONS.....	41
MARINE CORPS SOLUTIONS.....	44
RECOMMENDATIONS.....	54
BIBLIOGRAPHY.....	56

## **INTRODUCTION**

For the bulk of man's history, cities have represented the wealth and power of states and empires and constituted logical objectives in warfare.<sup>1</sup> In the era of siege warfare, an army arrived at the gates of his enemy's city and bid the occupants surrender, or come out and face certain destruction. After assessing their position--they determined that collectively they had the will and some means to resist--the citizens chose a third option. The citizens delivered the defiant message that the army would have to come in and dislodge every one of them by force. Now the onus was on the army. Would they lay siege or take the fight into to city? For political reasons, the onset of winter, or the lack of supplies to sustain a siege, this army chose the latter. In *On War*, Von Clausewitz states that, "a Siege is an operation that cannot result in disaster." History has shown that this tenant does not prove true in urban warfare. From the beginning to the end of the above, long forgotten conflict, all participants realized that something about this type of warfare, urban warfare, was very different.

Bringing the battle into the city marginalized the advantage of the attacker. On the open battlefield, the victor won possession of the field leaving the defeated to gather what was left and withdrew. When the field of battle was the city, no withdrawal was possible. In terms of the enemy's "will", the effect was dynamic. Like a cornered animal, the citizen who had chosen to fight in his own city, on his own terms, reduced the fight to an all or nothing struggle for survival. On the otherhand, the fact that he was fighting on familiar ground gave him several advantages. Natural barriers provided by

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<sup>1</sup> Lester M. Grau and Jacob W. Kipp, Urban Combat: Confronting the Specter (Fort Leavenworth, Kansas: Foreign Military Studies Office, 1991) 1.



built-up areas could be enhanced with minimal energy dedicated to construction. Man-made structures also provided vital cover and concealment of his movement, and vantagepoints for observation of his opponent. Lines of communication could be erratic, making them difficult to interdict. Additionally, citizens who would not normally have joined in the struggle were now fused to the struggle by their *de facto* investment—protection of necessary infrastructure, home, family, and livelihood.

For the aggressor, taking the fight to the city was just as different. First, as in siege warfare, this type of warfare required a huge investment in time and preparation. If subjugation of this particular city and its people was one of a series of objectives in an overall campaign, operational tempo would be destroyed. Secondly, while early armies foraged to supply war, here the army was bound to a geographical area that could only sustain his force for so long. Attrition of forces and supplies would require an investment of already strained manpower in the transportation of supplies and the extension of lines of communication to logistics stockpiles and pools of manpower. The aggressor would also find that attrition and consumption rates differed from what previous experience had predicted it would be. Urban warfare did not require the three to one advantage of the attacker versus the prepared defensive position, it required a five to one advantage, or greater, in personnel. Large, stagnant, poorly supplied troop populations were friends to disease and desertion and civilian and military casualties would be much higher. Finally, war in the city required the aggressor to modify some things he already possessed and acquire new things that he could not have imagined he would need.

In the seventeenth, eighteenth, nineteenth, and twentieth centuries, the preferred method of dealing with the question of urban warfare was to avoid it. Because

"possession of intact, undamaged cities remained a political goal, cities were often declared "open" and battles were fought outside the walls to avoid the economic and social chaos of prolonged sieges and vicious urban combat."<sup>2</sup> Military commanders became more interested in maneuver than in attrition warfare and avoided fighting in cities when possible. Whenever cities were contested, the civilian population was evacuated, encouraged to leave, or fled of their own volition. In the American Civil War the Union Army isolated cities, laid siege, and starved the occupants into submission. In World War II, for the most part, these methods were still applied. The air raids over Rangoon by the Japanese signaled the battle for Burma, caused an endless stream of evacuees headed north to India and China, while the French and Filipinos made the decision to declare Paris and Manila open. In World War II, the closest thing to total war, air power was used either to reduce cities and their industrial capability, or to bypass them altogether. There was no longer a need to capture them intact. Although there were exceptions (Okinawa and Warsaw for instance) throughout the twentieth century urban warfare has remained the exception and the war of last resort rather than the rule.

Today we cannot ignore the change in the strategic landscape. Three quarters of the world's population, 80 percent of the world's capital cities, and nearly all the market places for international trade can be found in littoral regions.<sup>3</sup> The percentage of peoples living in urban as compared to rural settings continues to rise so that by 2025 the UN predicts that 60 percent of the world population will live in urban areas.<sup>4</sup> Finally, urban

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<sup>2</sup> Grau and Kipp, Confronting the Specter 3.

<sup>3</sup> United States Marine Corps, United States Marine Corps Warfighting Concepts for the 21<sup>st</sup> Century (Quantico, Virginia: Concepts Division, Marine Corps Combat Development Command, undated) I-4.

<sup>4</sup> Paul K. Van Riper, A Concept for Future Military Operations in Urbanized Terrain (Quantico, Virginia: Marine Corps Gazette, 1997) insert A-1.

warfare, if anything, has become more complicated and unpredictable: news teams project live footage around the globe; laying waste to cities and heavy civilian casualties may be politically untenable; changing rules of engagement cause confusion; non-combatants mix with combatants, while combatants may, or may not, wear uniforms; non-combatants can be found where least expected, and cannot be counted on to act sensibly; and commanders are forced to dealing with civilian refugees and injured..

### Understanding the Urban Warfare Problem

The Marine Corps' approach to solving some of the enduring problems of waging urban war has been a series of concept-based experiments in support of a Five-Year Experimentation Plan under the supervision of relatively new Marine Corps Warfighting Lab (MCWL).<sup>5</sup> The Marine Corps' efforts have resulted in two Amphibious Warfare Experiments (AWE)--Hunter Warrior and Urban Warrior. The first experiment, Hunter Warrior, tested three primary innovations. These innovations were dispersed operations on an extended littoral battlefield; the application of digital technology, combined with new organizational and procedural concepts; and the "flattening" of the traditional command architecture or at least the communications architecture.<sup>6</sup> Building on Hunter Warrior, Urban Warrior investigated a range of further enhancements aimed at ensuring that forward afloat forces could effectively "cap" a crisis in the urban environment.<sup>7</sup> Urban Warrior culminated in a sea-based assault into Oakland, California, and applied

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<sup>5</sup> United States Marine Corps, Hunter Warrior Workshop Assessment (Virginia: Prepared by the Wargaming Division, Marine Corps Combat Development Command, and the Office of Net Assessment of the Office of the Secretary of Defense SIAC Project No. 01-1175-08—4508-001) 3.

<sup>6</sup> Hunter Warrior Assessment 4,5.

<sup>7</sup> United States Marine Corps, Urban Warrior: Conceptual Experimental Framework (Virginia: Marine Corps Warfighting Lab, Marine Corps Combat Development Command, 1998) 1.

the innovations developed in Hunter Warrior. In contrast to Hunter Warrior, participating ground forces relied heavily on augmentation of commercial off-the-shelf technologies, and were pitted against role players using conventional tactics and equipment. The last experiment in the first Five-Year Experimentation Plan will be Capable Warrior. Project Metropolis, the first segment of Capable Warrior will exploit and refine lessons learned from previous experiments. A second Five-Year Experimentation Plan is currently under development and will tentatively include Information Warrior, Coalition Warrior, and Future Warrior. In both Hunter Warrior and Urban Warrior, logistics took a back seat to tactics, and tactics to technology. What this tactically and technology centered approach lacked, logistically, was an in-depth look into the logistics required of urban warfare. Additionally, the reliance on off-the-shelf technology focused direction towards organizing to the technology, rather than fitting technologies to support requirements. The first Five-Year Experimentation Plan failed to address the question that if the capability to successfully wage war in urban terrain is now necessary, how do we logistically support it? What are the logistics requirements unique to urban warfare? And, what are the logistics capabilities needed to support those unique requirements?

This paper will focus on the latter two questions regarding the effective support of small infantry unit (the infantry battalion) in 21st Century urban conflict. This paper will review urban warfare lessons learned, as identified by the Marine Corps Intelligence Activity (MCIA) in three post World War II urban conflicts, in order to identify requirements unique to urban warfare. Once identified, this paper will review Marine Corps' approaches to addressing these problems and make recommendations for solving inconsistencies.

## **IDENTIFICATION OF UNIQUE REQUIREMENTS**

The Marine Corps Intelligence Activity (MCIA) has compiled a set of 70 urban warfare lessons learned shared in common by three other nations carrying out military operations in cities. The MCIA lessons learned are based on the 1982 Israeli military invasion of southern Lebanon, British military actions in Northern Ireland (1969-76), and Russian military operations in Chechnya (1994-96).<sup>8</sup> These military actions are relevant to future U.S. military operations for many reasons. They all took place in major cities. The countries all sought, at least initially, to limit civilian casualties and collateral damage. The belligerents used modern military or terrorist equipment, to include non-lethal weapons. Furthermore, each of the conflicts is well documented. The MCIA lessons learned cover many disciplines and can be broken down into strategic, operational, and tactical levels of war. MCIA also addressed technical lessons learned. Many lessons have implications at multiple levels. Thirty-two of the 70 lessons learned relate in some way to logistics.

Lessons are often defined as something learned from experience. In the military, “lessons learned” are compiled post operation, or exercise, and can be equated to those experiences that caused the participant the most concern. Lessons learned also provide a source of information for planners who may be planning the deployment of units into a

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<sup>8</sup> Each of these conflicts had unique strategic conditions under which they were fought. With national survival at stake, Israel launched their attacks into Lebanon to break Syrian influence and drive the PLO out of the country. First conceived as a short operation (3 days) with limited objectives, the conflict lasted three months, with a one-year occupation. Chechnya was an internal war (Chechnya, unlike Georgia, was part of the Russian federation) where Russia attempted to restore primacy over a breakaway republic. Russian military leaders were unaccustomed to considering the impact of media attention or public opinion. The British viewed the actions of the IRA as an internal revolt, whereas the IRA viewed the British as invaders. The British perception and traditional respect for rule of law was a constraint on their military options. Regardless of the strategic conditions under which each of these conflicts was waged, there is commonality in logistical difficulties each country faced.

similar area, an area with similar geopolitical characteristics, or where missions are similar. Requirements unique to the urban conflict can be identified through matching lessons learned in actual conflict with their corresponding logistical functional areas. At the tactical level of war, logistical functional areas are supply, maintenance, transportation, health services, engineering, and services. Engineering as a functional area of combat service support refers to deliberate engineering as opposed to combat engineering, and services are items such as laundry and consumable personal-use items (e.g. soap, shampoo, exchange items, etc.). While the MCIA lessons learned are an excellent point of reference for discussion, their lessons learned should not be considered all inclusive. The 1968 Battle for Hue City and Russian operations in the North Caucasus offer additional insights into casualty dynamics. This section will look at MCIA lessons learned, and lessons learned from other conflicts, and then organize and analyze them based on logistical functional area.

Below is a list of MCIA's lessons learned followed by Figure 1-1. Figure 1-1 assigns lesson learned to pertinent logistical functional area.

#### Strategic Lessons

Lesson 8: Concern for civilian casualties and property damage decline as casualties among security forces rise.

#### Operational Lessons

Lesson 16: The tempo of operations in an urban environment is so intense that personnel tend to "burn out" quickly.

Lesson 18: Urban combat is extremely manpower intensive and produces significant attrition of men and materiel among attackers.

Lesson 20: Urban operations usually stress the logistics system because of the unusual requirements and abnormally high consumption rates.

Lesson 22: The spatial qualities and perspective of urban and conventional warfare differ. Urban combat is more “vertical” in that operations routinely reach up into tall buildings and down into sewers and basements.

Lesson 24: The large-scale movement of urban non-combatants can significantly hinder military operations.

Lesson 25: Non-combatants cannot be counted on to behave sensibly.

### Tactical Lessons

Lesson 32: Forces operating in cities need special equipment not found in standard table of organization and equipment.

Lesson 33: Tanks and armored personnel carriers cannot operate in cities without extensive dismounted infantry support.

Lesson 36: Fratricide is a serious problem in cities because it is harder to identify friend from foe.

Lesson 37: Major civilian structures in cities (e.g. hospitals, churches, banks, embassies) are cited in such a way as to be tactically useful locations, command key intersections, and/or are built of especially solid construction. Therefore such facilities are especially useful to urban defenders.

Lesson 38: Direct-fire artillery can be a valuable tool in urban combat, provided one does not care about collateral damage.

Lesson 40: Recovering damaged armored vehicles is more difficult in urban areas.

Lesson 42: Hit-and-run ambushes by small groups are the favorite tactic of urban paramilitary forces.

Lesson 43: Tracked vehicles are preferable to wheeled vehicles in situations where there is likely to be large amounts of rubble in the streets. Otherwise wheeled armored vehicles are preferable.

Lesson 44: Helicopters are not well suited for urban combat, but are quite useful in redeploying forces and supplies to just behind the forward edge of operations.

Lesson 45: Soldier loads must be dramatically reduced because urban warfare requires greater individual agility.

Lesson 48: The shock value of artillery fire diminishes over time.

### Technical Lessons

Lesson 50: Small arms, though not decisive, play a disproportionately significant role in the outcome of urban battles.

Lesson 51: Individual flak jackets significantly reduce urban casualties.

Lesson 52: Smoke enhances survivability in urban situations, but carries significant operational penalties (e.g. impedes visual communications, taxes driving skills of vehicle operators, and slows the overall rate of advance).

Lesson 53: Mortars are highly regarded by both attackers and defenders in urban operations, but may be less effective than supposed.

Lesson 54: Machine guns may be more valuable than assault rifles for urban combat.

Lesson 55: Air defense guns are valuable for suppressing ground targets.

Lesson 59: Rocket-propelled grenades (RPGs) are omnipresent and very effective weapons in urban combat.

Lesson 59: Armored vehicles require more protection when operating in cities and that protection needs to be distributed differently than for [the] conventional battlefield.<sup>9</sup>

Lesson 61: The enemy often employs home-made weapons, even including chemical weapons, against security forces.

Lesson 62: Lightly protected armored vehicles are of limited value in urban terrain.

Lesson 63: Combat engineering equipment, especially armored bulldozers, are critical assets in urban combat.

Lesson 67: “Bunker busting” weapons are invaluable for urban warfare.

Lesson 68: “Non-lethal” technologies were seldom used for combat missions. Instead, “non-lethals” were more generally employed for crowd control and riot suppression.

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<sup>9</sup> This lesson number is listed twice in original text.



Lesson 69: Extensive use of “non-lethal” weapons can become counter productive because demonstrators can build up immunity to their effects, especially the shock value of such weapons.

<b>LOGISTICAL FUNCTIONAL AREA</b>	<b>CORRESPONDING LESSON LEARNED</b>
<b>Supply</b>	8, 18, 22, 24, 25, 32, 37, 38, 50, 51, 53, 54, 55, 59, 67, 68, 69
<b>Maintenance</b>	None related
<b>Transportation</b>	8, 16, 18, 22, 24, 25, 33, 40, 42, 43, 44, 45, 48, 50, 53, 54, 55, 59, 59, 62, 63, 67, 68, 69
<b>Health Services</b>	16, 18, 24, 36, 42, 53, 61
<b>Engineer</b>	37
<b>Services</b>	16

Figure 1-1

Although some relationships are clear, “*individual flak jackets significantly reduce urban casualties,*” for instance, would relate only to the functional area of supply because flak jackets are distributed once--hopefully before the battle. Other functional areas are implied. For example, if “*small arms, though not decisive, play a disproportionately significant role in the outcome of urban battles,*” is the lesson learned, this lesson would relate to the functional areas of both supply and transportation. More small ammunition would have to be requisitioned (a function of supply), but then additional transportation would be required to get the ammunition into the hands of those who need it most.

Of the MCIA lessons learned, none related to maintenance and only one to both engineering and services. Seventeen however, relate to the functional area of supply, twenty-four to transportation, and seven to health services. Thirteen lessons learned relate to both supply and transportation. In most instances this can be explained as being

a problem of requisition and distribution as stated above, but also holds true when a lesson learned refers to the use of an item that requires mobility. Trailer mounted anti-aircraft guns in a direct fire mode, for instance, would require additional transportation to both supply it with ammunition and move it around the battlefield.

Relating lessons learned to functional area also serves to focus logistical discussion and logistical planning efforts. Overwhelmingly, MCIA lessons learned express concerns in the functional areas of supply and transportation. Health services came in a distant third, but have very unique qualities in relation to the urban environment that merit discussion. This paper will not discuss maintenance. No significant change in maintenance other than volume was noted.

## SUPPLY

From the MCIA lessons learned we see that urban combat demands: the handling of enormous quantities of bulk items, namely food, water, and fuel; that logistics systems keep up with a tempo that stresses systems with abnormally high consumption rates and the requirement for a high degree of flexibility; and that ground troops need to receive the specialty items they require at the right time. In Belfast and Beirut, logistics systems had to respond to abrupt changes in rules of engagement (ROE), and in Belfast, Beirut, and Grozny, logistics systems had to respond to complications caused by the presence of non-combatants, prisoners of war and detainees.

### Constants

Food and Water. In supplying war some requirements have changed little over time, namely the requirements of the human body for food and water. While urban warfare does not change consumption rates for these items, next to fuel they compose the bulk of overall requirements and merit some discussion. With our current ration (the Meal Ready to Eat) an infantry battalion (reinforced), 1,200 Marines, would require 3600 meal per day, roughly 1.5 five-ton trucks worth. In a temperate climate, these same Marines would consume 7,320 gallons of water per day, calculated at 6.10 gallons per man per day (this requirement covers water required for drinking, personal hygiene, field feeding (reconstituting rations, etc.), and heat injury treatment. In cities, access to water relies on an infrastructure (electricity, pipes, pumping stations, etc.) which, more likely than not, requires some aspect of restoration. Additionally, the city's source of water can be easily denied by intentional contamination. For example, in the attack on Grozny, clean drinking water became a high-demand item and highlighted some of the problems

encountered in the urban environment.<sup>10</sup> The urban war requires agility of its troops above that required in conventional warfare. The urban combatant has to be able to slip through windows and other small openings and jump into sewers and across rooftops. Such activity is a thirsty business. The Russians found that individual paticides (e.g. chlorine tables, iodine tablets, etc. issued to the individual soldier) took too long to work which made delivery of clean water to forward units difficult to provide.<sup>11</sup> If water has to be distributed to refugees, the supply situation is further exacerbated. In counter-terrorist operations in the North Caucasus, the Russian were forced to ration water at a drastic rate of .751 liters per man due to the difficulty of delivering water forward.<sup>12</sup> In Grozny, Russian dry rations that required reconstitution with water often had to be eaten dry for the same reason.<sup>13</sup>

Fuel. The other constant on any modern battlefield is the need for bulk fuel (as opposed to packaged fuel such as oils and lubricants). Fuel is probably the most critical item on the modern battlefield except for ammunition and competes for transportation with everything else. The standard Marine infantry battalion is authorized approximately 63 vehicles, all of which are mounted on the standard highly mobile, multipurpose, wheeled vehicle (HMMWV) chassis. These vehicles have twenty-gallon fuel tanks. If each of these vehicles goes through half of one tank of gas per day, the daily fuel requirement is 630 gallons of diesel. If augmented with tanks, artillery, or engineer equipment, fuel requirements skyrocket. With the addition of one tank platoon, fuel

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<sup>10</sup> Lester M. Grau and Jacob W. Kipp, "Soft Log" and Concrete Canyons: Russian Urban Combat Logistics in Grozny (Fort Leavenworth, Kansas: Foreign Military Studies Office, 1999) 4.

<sup>11</sup> Grau and Kipp, "Soft Log" 4.

<sup>12</sup> Press Conference with Vladimir I. Issakov, Head of Logistics of the Russian Armed Forces, Deputy Defense Minister and Ivan M. Chizh, Head of the Military-Medical Directorate of the Defense Ministry, Logistics of the Counter-Terrorist Operation in the North Caususus (1999)

<sup>13</sup> Grau and Kipp, "Soft Log" 3.

requirements triple. The Russians used over 200,000 gallons of fuel in the battle for Grozny.<sup>14</sup>

Acquisition and delivery of bulk supplies should be foremost in logistics plans. Planners must consider placing critical supplies as close as possible to the fighting. In the U.S. military, many of our plans rely heavily on host nation support. In the battle for Grozny, the Russians did not require host nation support and still had major problems. For Grozny, “the majority of logistics support facilities and units were positioned near the Mozdok garrison.”<sup>15</sup> Mozdok provided the Russians a good railhead and airfield and is approximately 110 kilometers for Grozny<sup>16</sup>--a relatively short haul. The Russians controlled this area and established three truck lines of communication into the city. Initially, they had an estimated 2,850 long haul trucks in support of ground forces, but the requirement jumped to 6,700 trucks during the assault on Grozny.<sup>17</sup> Even with their advantages, the Russians were constantly frustrated by their inability to move supplies and equipment forward. In operations in the North Caucasus, Russian planners were even less fortunate. The Chechen people had nothing contractual to provide and locally made fuel was “not suited” to Russian military equipment.<sup>18</sup> These examples illustrate the extent that bulk fuel, water, and food will remain obstacles to any successful logistics plans.

Special Equipment. In urban warfare, requirements constantly call for large quantities of items not generally assigned to combat units. These special items include:

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<sup>14</sup> Grau and Kipp, “Soft Log” 4.

<sup>15</sup> Grau and Kipp, “Soft Log” 3.

<sup>16</sup> Grau and Kipp, “Soft Log” 3.

<sup>17</sup> Grau and Kipp, “Soft Log” 5.

<sup>18</sup> Issakov and Chizh, Press Conference 3.

items combat units normally have, but need in greater quantity; items combat units do not usually carry on-hand for conventional operations, but can operate with minimal training; and items that require equipment and personnel augmentation. The first order of items is things such as weapons mix. For example, Syrian experience in Lebanon suggests that machine guns, especially heavy machine guns (they used 12.7mm machine guns) are more valuable than assault rifles for urban warfare.<sup>19</sup> Machine guns offer a higher rate of fire and better penetration of concrete and cinder block structures. Additionally, heavier caliber rifles, such as the 7.62 mm and above rifles offer better penetration. Both machine guns and heavier caliber rifles are in the Marine Corps inventory, but not in the quantities required.

The second order of item is composed of things like non-lethal weapons. These items include batons, riot shields, tear gas, loud speakers, water cannons, marking dye for identification of specific demonstrators, wire ties and handcuffs, metal spikes strips for hasty road barriers, ropes, light weight scaling ladders, hand held mirrors for seeing around corners, grappling hooks, and hand-held radios. Combat units can be easily trained to employ these weapons, but do not normally have them in their inventories. In Belfast, British units extensively used non-lethal weapons, but initially did not have enough “kits” to go around. Kits were shipped from as far away as Hong Kong to fill this critical deficiency.

The third order of item includes such things as shock weapons, engineering equipment, and armored vehicle support. Across the board, shock weapons have proven their worth in urban warfare. Shock weapons are weapons that are used for their

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<sup>19</sup> United States, Urban Warfare: Lessons Learned Beirut 1982 (Pre-Publication Draft) (Virginia: MCIA, 1997) 12.

overwhelming psychological impact as well as their ability to inflict casualties. The effects looked for in shock weapons are overwhelming firepower, or concussion sufficient to produce enough dust and debris as to put the enemy in flight for his life. The Israelis found the M163 Vulcan 20mm anti-aircraft gun to be very useful in this role. Mounted on the M113, the M163 gunner was offered some protection and the gun could be elevated to a higher degree than most vehicular mounted weapons systems. Also, the M163 had a high rate of fire that was perfect for suppressing snipers and intimidating opponents.<sup>20</sup> In Grozny, the Russians found their most effective weapon to be the ZSU 23-4, a 23mm, and lightly armored, self-propelled anti-aircraft gun capable of delivering 3,200 rounds per minute<sup>21</sup> for the same reason. Unfortunately in urban warfare both non-lethal weapons and shock weapons have their drawbacks. Foremost in the drawbacks are unique and high quantities of ammunition, respectively. The second drawback is that after time both weapons become less effective as the enemy becomes accustomed to their effects. To counter this, the logistics system may have to move these items across the battlefield to place them where they are most useful.

Engineering equipment has its place on the urban battlefield. Engineers along with their armored bulldozers are critical assets. Bulldozers can clear barricades, which may be mined,<sup>22</sup> be used to keep lines of communication open, clear rubble and debris, and smother bunkers. Engineers can also establish firing positions and harden buildings that may be considered “key” terrain, because they command key intersections or are built of especially strong materials. In conjunction with engineers and their assets,

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<sup>20</sup> MCIA Beirut 12.

<sup>21</sup> Grau and Kipp, “Soft Log” 4.

<sup>22</sup> MCIA Beirut 14.

explosive ordnance disposal teams can work hand-in-hand with engineers disarm and remove mines, booby traps, and neutralize any number of homemade devices and friendly "dud" munitions. Explosive ordnance personnel can also inspect captured weapons caches, either destroying them in place or recommending them for destruction.<sup>23</sup>

### High Demand Items

Small arms, though not decisive, still play a disproportionate role in the outcome of the urban conflict,<sup>24</sup> and they probably will for some time to come.<sup>25</sup> There are many reasons for this. Small arms in the hands of competent marksmen are critical assets for precise, killing shots against enemy soldiers wearing protective body armor and or firing from covered positions where a very small target area is presented. Small arms provide the agile urban combatant weapons that are both very portable and weapons that have great capabilities at a very small cost in weight. Likewise, the transportability of small arms ammunition gives the urban combatant the highest quantity of individual round per weight. Small arms can be used in a variety of tactical roles like clearing buildings with minimal collateral damage, supportive fires, and suppression of enemy snipers. The British noted in Belfast that the ratio of shots fired to hits achieved in urban areas was disappointingly low compared to sniper operations outside cities.<sup>26</sup> The British cited the density of cover afforded within the city for this difference. Therefore, urban warfare will continue to require that vast amounts of small arms ammunition are available and that they can be transported where they are most needed.

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<sup>23</sup> MCIA Beirut 10.

<sup>24</sup> MCIA Beirut 11.

<sup>25</sup> This statement while true for the urban soldier who is wearing body armor, would not be true for soldiers who do not wear armor. Fragmentation weapons are present in higher numbers in the modern urban conflict than they are on the modern conventional battlefield. Israeli estimates, based on counting actual hits on fragmentation vests, predict that casualties would have been 20% higher without body armor.

<sup>26</sup> MCIA Belfast 13.



Urban combat also requires access to a wide range of weapons and ordnance options. When employed, these weapons and ordnance items consume ammunition or are consumed themselves (e.g. grenades) at higher rates than in a conventional conflict. Sometimes higher consumption rates are driven by the weapon system employed, like a machine gun or antiaircraft gun, and sometimes standing operating procedures (SOPs) drives them. SOPs in building clearing can call for one or two grenades to be thrown into a room to kill or disable enemy combatants prior to friendly forces entering the room. For a standard three-bedroom home that could be as many as 14 grenades. In a single crowd control operation in Belfast, the British Army used 700 tear gas cartridges and grenades.<sup>27</sup> Weapons that have proven their worth in urban combat include non-lethal weapons, various types of grenades, rocket propelled grenades, mortars, and shock weapons (as discussed above). The majority of these weapon systems are bulky themselves or require bulky ammunition. Additional bulk requires additional transportation assets or increases the number of lifts required. While one can of 7.62 linked ball ammunition contains 800 rounds, a container of 40mm CS grenades used in a grenade launcher, which comes in a container twice the size, contains 32 grenades. CS hand grenades, which are more bulky still, are packaged 16 grenades per can. Compatibility, the necessary requirements for minimum separation of ammunition types—if they can be transported together at all—can also increase the overall cubic size of ammunition loads. An additional constraint on logistics systems is the inherent weight of ammunition and its packaging, which will often exceed the carrying capacity of its transportation before taking advantage of the available cubic space. For example, one military 5-ton truck can only carry 96,000 rounds of 7.62-mm ammunition (three

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<sup>27</sup> MCIA Belfast 9.

standard pallets, 46 inches in height). Just increasing the size of the rounds to .50 caliber, the ammunition used in the revered M2 machine gun, the same 5-ton truckload could only carry 24,000 rounds—one quarter the amount! Overall weight represents a significant burden when considering that the mortars and artillery ammunition also make up a good proportion of the ammunition used in urban warfare. The Israelis and Russians relied heavily on smoke to conceal tactical movement. For this reason, both Israelis and Russians found that a preponderance of their artillery and mortar rounds were smoke or illumination rounds. In Grozny, smoke and white phosphorous rounds accounted for one-fifth of all artillery ammunition fired.<sup>28</sup>

Other high demand items include items that are consumed or unrecoverable. Consumable items are items such as grappling hooks, scaling ladders, ropes, and breaching devices. These items are necessary where troops must gain access to urban structures through least likely avenues of approach. Depending on materials used in construction (wood or concrete materials abrade ropes and cause metal fatigue at different rates) and intensity of conflict (in a close quarters battle, these items can be easily destroyed by the enemy), consumption of these items can be very high. Unrecoverable items include items related to engineering improvements of key terrain (sand bags and wood to reinforcing key buildings and positions) or engineering to deny the enemy access to key sewers, buildings, etc.

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<sup>28</sup> Grau and Kipp, “Soft Log” 4.

## TRANSPORTATION

Twenty-four MCIA lessons learned are related to the functional area of transportation. As stated earlier, many of these same lessons learned also applied to the functional area of supply. While it is easy to forget the inextricable link between supply and transportation in garrison, because of the ready availability of commercial delivery and absence of truly “critical” needs, the link in war is immediately obvious. In wartime, the reliance on commercial or contracted assets to support frontline operations is not an option. Likewise, because of the high rate of consumption in urban warfare, the critical link between a flexible supply system and a transportation system capable of responding is clearer still. Mobility, the ability to move personnel, supplies, and equipment quickly to point where they will have decisive effects, plays a key role in the asymmetrical environment that is urban warfare. Transportation assets are critical to providing that mobility which gets food and water to the frontline troops, and a shock weapon from one part of the city where its effectiveness is waning, to another part of the city where it is effective. Transportation assets also act as modern day mules by relieving soldiers of the weight they would normally carry in a conventional conflict, and evacuate casualties, refugees, and prisoners of war.

Moving Sustainment Troops and Equipment. In fighting in a large urban landscape, the enemy inhabitants can often dictate the terms and the terrain in which you fight. The Chechens conducted a well-conceived mobile “occasional” defense in Grozny. Like most modern armies the Russians identified enemy positions and stockpiled supplies and munitions for a planned attack against a particular strong point only to find out

during the assault that the enemy had relocated.<sup>29</sup> Sometimes they were not gone at all, but occupying the middle floors of buildings while the Russians controlled the street level and the roof. Russian assets were probably sufficient in quantity to mobilize instead of stockpiling supplies (they had 6,700 trucks supporting the assault on Grozny), but were insufficient in vehicle capabilities. Another tactic employed in conjunction with the Chechen's mobile defense was to offer no resistance until the Russians were deep into the city. This tactic lengthened Russian supply lines and forced the Russians to make some hard decisions. These choices included: assume the risk of doing nothing; divert combat force personnel to secure lines of communication or use them to escort support vehicles; or, prohibit "soft"<sup>30</sup> vehicles from entering certain areas. The Russians chose the latter which in effect limited the number of assets available to support frontline troops. Because they lacked sufficient quantities and types of armored vehicles, other than troop carriers, the Russians had to move supplies to forward units by transferring loads from soft heavy motor transports to hardened vehicles. The multiple handling of items and reconfiguration of vehicle loads were continued constraints on Russian abilities to deliver supplies forward.

Because Russian fuel trucks were not armored, fuel also had to be transferred to onto BTRs, MTLBs or packaged in smaller containers and moved by hand<sup>31</sup> for movement forward. BTRs and MTLBs are primarily designed for carrying troops, not cargo, and had to make several trips to deliver one truck's load.<sup>32</sup> The Israelis shared this experience. Because of the PLO's access to RPG's, the Israelis were also forced to stop

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<sup>29</sup> Grau and Kipp, "Soft Log" 2.

<sup>30</sup> "Soft" refers to vehicles that provide little protection to crew or cargo.

<sup>31</sup> Grau and Kipp, "Soft Log" 5.

<sup>32</sup> Grau and Kipp, "Soft Log" 5.

using their M113 armored personnel carriers and trucks near the front lines.<sup>33</sup>

Unfortunately, with any armored vehicle carrying capacity is compromised for protection. In the end, this meant given the choice between food, water, and ammunition, many frontline Russian troops went hungry.

Another drawback for the Russian and Israelis was that the ground commander lost tactical assets to ensure the delivery of what combat service support they did get. The Marine infantry battalion faces a similar constraint. For example, of the 63 vehicles standard to a Marine infantry battalion, only the ten to twelve vehicles, which provide platforms for heavy the machine guns and anti tank weapons, are armored; and those only lightly. Because of the weight of the armor, current HMMWV armored vehicles have little cargo space. The remaining infantry vehicles have standard aluminum bodies with canvas or rubberized cloth crew compartments and vinyl side and standard auto glass front windshields. After supporting the vehicles required support company commands, communications, and the battalion command post, the infantry company gunnery sergeant usually has one soft HMMWV at his disposal to support his company.

Vertical lift assets. The Israelis relied on helicopters to transport troops and equipment around bottlenecks, and remove wounded<sup>34</sup>--they were not used to support frontline troops. The Russians initially employed helicopters in several logistics roles, but then restricted them from forward areas after having several shot down by Chechens.<sup>35</sup> Afterwards, the Russians restricted helicopter movement much as they had ground vehicle movement. Vertical lift assets in urban terrain are, and will, remain

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<sup>33</sup> MCIA Beirut 8.

<sup>34</sup> MCIA Beirut 8.

<sup>35</sup> Grau and Kipp, "Soft Log" 5.

susceptible to enemy fire and are harder to harden and protect than ground assets. Unlike ground assets however, there seemed to be a higher cost to unit morale in losing a helicopter assigned to a combat service support mission than a ground vehicle assigned to the same role. This theme was common to Israeli, British, and Russian experiences. Given the choice between medical evacuation and by ground assets, which are relatively easy to abandoned in an emergency situation, or a helicopter, the common soldier probably feels more confident in the ground vehicle—especially after word gets around that several helicopters have already been shot down. Current vertical lift assets are also very expensive to replace when compared to ground vehicles. After losing 29 important senior intelligence officials in a single helicopter crash, the British used helicopters very little in Northern Ireland. Even though the crash could not be related to enemy activity, the Royal Air Force presence in Northern Ireland consisted of only two support helicopters.<sup>36</sup>

Wheeled versus Tracked Vehicles. There is some debate over which is better in urban warfare, wheeled or tracked vehicles. MCIA Lesson 43 correctly states the preference, “[t]racked vehicles are preferable to wheeled vehicles in situations where there is likely to be large amounts of rubble in the streets.” More succinctly put, the lesson learned is that tracked vehicles are preferred because they can carry more weight and offer greater armored protection, but not the vehicle of choice when collateral damage is an issue. Another limitation for tracked vehicles is technical. Because most tracked vehicle weapons systems are designed for standoff, their weapons systems are inadequate for urban fighting. In Northern Ireland the British preferred wheeled assets because they operated on narrow streets. Collateral damage to infrastructure and sharing

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<sup>36</sup> MCIA Belfast 13.

the road with civilian traffic was also a major consideration. Wheeled vehicles are faster, quieter, and more maneuverable. Tracked vehicles (for the most part tanks), on the other hand, were difficult to operate on the narrow Belfast streets and harder to recover for maintenance. Tracked vehicles also caused significant damage to city streets, making passage by wheeled vehicles either difficult or impossible. The British also found tracked vehicles very noisy (noise makes it difficult for coordinated work with dismounted troops) and expensive to operate. Finally, senior British commanders worried that because “most laymen categorize all tracked vehicles as “tanks”, the deployment of tracked vehicles was politically unacceptable.<sup>37</sup> Depending on the situation, this mindset may still apply, thereby restricting the use of some types of vehicles.

Another often-cited problem when discussing or using tracked vehicles is that the majority of tracked vehicles have weapons systems that were made for engaging targets at a considerable distance, in a direct fire mode. Weapon systems that cannot elevate sufficiently in order to see or engage a threat in a multi-story building are a liability in the urban environment—one of the reasons for the popularity of the Russian ZSU 23-4 and the American made 155 mm self-propelled howitzer.

The drawbacks of wheeled vehicles in urban terrain are their relatively light armor, and their inability to transverse rubble or create their own path through light or improvised barriers. None of these drawbacks are insurmountable. The former can be overcome by appliqué armor, but again, at cost of additional weight and a reduction of lift. Attaching engineers equipped with armored bulldozers and breaching equipment can overcome the latter two deficiencies. Israeli troops much preferred the improvised,

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<sup>37</sup> MCIA Belfast 11.

cramped, but safe space afforded by removing the ammunition racks in the Merkava tank to the thin-skinned M113.<sup>38</sup> The a tendency of M113's aluminum armor to catch fire after being hit by a rocket-propelled grenade made it a liability for transporting men or material close to the front.

A drawback shared by both tracked and wheeled vehicles was poor driver visibility when buttoned-up. The addition of smoke on the battlefield adds a further complication. To compensate for poor visibility drivers in each of the cases studied had a tendency to leave hatches open, making them vulnerable to any thrown or propelled object. In Belfast the British added makeshift wire cages over vehicle superstructures to defeat petrol bombs, and missiles thrown by rioters. The makeshift wire cages also prevented rocket-propelled grenades from entering into the open hatch.

Modern Day Mules. The agility required of the urban fighter is different than that required of the soldiers in conventional combat. Soldiers in conventional combat carry the majority of their personal equipment, rations, and ammunition supplies on their back. Their packs are bulky, but do not detract from their ability to see or get down and return fire from the prone position. If the situation requires, most packs can quickly released and reclaimed after the shooting has died down. In the urban conflict this simply does not work. The urban combatant must have ability to slip easily through windows, doors, and into attics and below ground sewers systems. The urban combatant also needs to be light, and agile enough move across fire escapes and rooftops. As identified previously, he will also need much more ammunition than his conventional counterpart, but cannot afford to be weighed down. In the battle for Hue City, the Marines had a vehicle known as the M274A5 or "Mule". The Mule was a small, low cost, single driver vehicle, which

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<sup>38</sup> MCIA Beirut 14.



was light enough to be lifted over small obstacles by a squad of Marines. Though slow and cantankerous it relieved a squad of carrying up to one-half ton of support equipment thereby allowing the Marines to lighten their loads. Marines used the vehicle extensively in this role in the retaking of Hue. Due to safety considerations (the vehicle flipped easily) the Mule was later removed from the Marine Corps' inventory. In concept, the vehicle filled a valid need for the urban combatant. Additionally, the flexibility afforded by this type of vehicle has tremendous implications, when considering that it could be used carry special equipment. For example, in Beirut, Belfast, and Grozny, frontline troops were continually encountering civilians where they were least expected. A small vehicle, like the mule, in support of frontline troops could carry items for processing civilians and refugees, as well as, specialized tactical and non-lethal equipment.<sup>39</sup>

Evacuation of Casualties, Refugees, and Prisoners of War. There is a stark difference in the number of casualties to be expected in urban warfare that will be discussed in the following section. The evidence presented in that section concludes that, once the conflict enters urban terrain, casualty rates can be expected to rise thirty-five to forty-one percent. The transportation system that supports the urban fight will have to deal with that increase. In Beirut, Northern Ireland, and Chechnya there was an unfulfilled need for a specially designed armored ambulance for the evacuation of frontline troops. In their counter-terrorist operations in the North Caucasus, the Russian Army located medical stations 400-500 meters away from the frontline. Medical Battalions were located 800-1000 meters away.<sup>40</sup> In the Caucasus, the mountainous

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<sup>39</sup> These special items include items such as pamphlets with directions for safe passage, basic medical supplies, processing forms, etc.

<sup>40</sup> Issakov and Chizh, Press Conference 3.

terrain allowed for the close proximity of medical station. In the urban terrain of Beirut, Northern Ireland, and Chechnya, unless the medical stations could be dug-in or located in a secure basement of a building of especially strong construction, they were established at a much greater distance from the fighting. Air medical evacuation was only for patients requiring more extensive medical care than the field medical stations could provide. In those instances medical evacuation by air was only provided between nodes known to be absolutely secure. Air medical evacuation of frontline troops was not an option. The Israeli solution was again the improvised, cramped space afforded by removing the ammunition racks in the Merkava tank. The Russians used BTR-80s as makeshift ambulances.<sup>41</sup> Neither of these vehicles types is configured to allow medical personnel the freedom of movement to stabilize a severely wounded patient in transit.

The transportation of refugees and prisoners of war usually is not the responsibility of frontline battalions. In urban warfare, because the distinction between combatants and non-combatants is difficult to maintain and there is a greater chance that the two are commingled on the urban battlefield, commanders at the lowest level may find themselves dealing with combatant/non-combatant issues. Non-combatant issues can range from large-scale non-combatant movements, encountering pockets of non-combatants, to encountering populations where combatants take refuge in groups of non-combatants. Non-combatants cannot be counted on to act sensibly either. In Beirut, Israeli psychological warfare operations against the city of Tyre persuaded 30,000 non-combatants to flee for the beaches southwest of the city.<sup>42</sup> Later, half these people

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<sup>41</sup> Grau and Kipp, "Soft Log" 6.

<sup>42</sup> MCIA Beirut 6.

returned to the city in the midst of the fighting.<sup>43</sup> Additionally, the Israelis encountered non-combatants that just decided to endure the combat around them, either because they thought that if they left they would be killed and their houses looted, or because the fighting would be over shortly.<sup>44</sup> In either case, frontline troops and commanders should be equipped, at least mentally, to deal with non-combatants. When small numbers of non-combatants are found, and it is within the transportation capabilities of those frontline units to evacuate them, commanders should count on the use organic transportation assets for this purpose.

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<sup>43</sup> MCIA Beirut 6.

<sup>44</sup> MCIA Beirut 6.

## HEALTH SERVICES

Although there are only seven MCIA lessons learned that are related to the logistical functional area of health services, a 1991 study, published by the Naval Health Research Center, on casualty rates during the 1968 battle for Hue City provides a detailed explanation of casualty dynamics in urban warfare.

Health Services planning at the small unit level is directed at Echelon I care. Echelon I care is composed of immediate lifesaving measures and trauma management and includes self-aid/buddy-aid, medical corpsman, and physicians. Echelon II care is initial resuscitative treatment, dental, laboratory, x-ray, and patient holding capabilities. Echelon III care is resuscitative surgery, preoperative care, the service of qualified surgical teams, general anesthesia, and postoperative care. Echelon II and III care are performed by Marine Corps Medical Battalions belonging to the Force Service Support Groups (FSSGs) of the Marine Expeditionary Force (MEF), or U.S Army mobile army surgical hospitals (MASH) combat support hospitals, or forward surgical teams. Because the urban warfare has a drastic effect on the number of casualties taken by forward units, and the nature and types of wounds, this section will primarily look at the effects of urban warfare on Echelon I level of care.

Increased Lethality Rate. In his book “Attrition: Forecasting Casualties Battle Casualties and Equipment Losses”, Trevor N. Dupuy, acknowledges that although weapons systems have become increasingly lethal, warfare has become less deadly over the centuries (Refer to Figure 1-2).

<b>Battle Casualties for Selected Groups of Battles</b>			
	<b>Average Personnel Strength</b>	<b>Average Daily Number of Casualties</b>	<b>Average Daily Engagement Casualty Rate</b>
<b>American Civil War</b>			
<b>Union</b>	68,250	7,849	11.5
<b>Confederate</b>	50,193	7,529	15.0
<b>World War I</b>			
<b>British</b>	13,628	1,138	8.4
<b>German</b>	18,133	1,034	5.7
<b>1973 Arab-Israeli War</b>	<b>(33 Engagements)</b>		
<b>Israelis</b>	14,593	263	1.8
<b>Arabs</b>	51,296	1,385	2.7

Figure 1-2<sup>45</sup>

Although Dupuy does not address urban warfare, explicitly, he accounts for the trend towards less overall casualties in noting the movement toward greater tactical dispersion of combat troops. He gives the example that whereas “in antiquity an army of 100,000 men occupied an area of 1.0 square kilometer, with each soldiers share being 10 square meters on average... by the time of the 1973 Arab-Israeli War, the same army would occupy an area of 3,500 square kilometers, with the share per man being 35,000 square meters per man.”<sup>46</sup> One way to visualize is to note that what would equate to “500 men per football field in antiquity, dispersion has increased to seven football fields per man in the 1973 October War.”<sup>47</sup> What it is it about the urban environment that changes the casualty statistic?

<sup>45</sup> Trevor N. Dupuy, *Attrition: Forecasting Battle Casualties and Equipment Losses in Modern War* (Virginia: Hero Books, 1990) 45.

<sup>46</sup> Dupuy 28.

<sup>47</sup> Dupuy 29.

When the Marines entered Hue City in February 1968, casualties (Marines and sailors killed in action (KIA) and wounded in action (WIA)) across the 1<sup>st</sup> Marine Division were three times higher than those incurred in January—the reported number of KIAs reported was nearly five times higher.<sup>48</sup>

In trying to determine the levels of casualties that might be sustained during urban warfare, Christopher G. Blood and Marlisa E. Anderson compared casualty rates among the Marine Units that fought in Hue City in their article, “The Battle for Hue: Casualty and Disease Rates During Urban Warfare”. For comparison, they gave the Marine daily casualty rate per 1000 strength during the four-month period in which Marine involvement peaked in Vietnam. That casualty rate was 2.50 per 1000, while the KIA rate was 0.31. Blood and Anderson took their casualty figures directly from the unit diaries of three infantry battalions (1<sup>st</sup> Battalion, 1<sup>st</sup> Marines; 1<sup>st</sup> Battalion, 5<sup>th</sup> Marines; and 2<sup>nd</sup> Battalion, 5<sup>th</sup> Marines) for each of the three phases of the battle: fighting south of the Huong River, house-to-house; fighting in the Inner Citadel, inner city; and pursuit and mopping up. They found that the house-to-house fighting south of the Houng River yielded an overall casualty rate of 37.9 per 1000 strength per day, while the overall casualty rate in the inner city was 44.4. The overall casualty rate during the mopping-up phase was 5.8 per 1000 strength. Simply stated, these numbers show an increase in the overall casualty rate proportionate to the complexity of the urban terrain. More interesting, however, is the increase in KIA rate during inner city phase of the battle. The inner city KIA rate was 7.8 per 1000 strength! This rise in the ratio of killed to wounded is reconfirmed by the Russian experience in Grozny and Israeli experiences in Beirut. In Grozny, “the majority of those that were killed or died of wounds were hit in the head or

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<sup>48</sup> Numbers extracted from History and Museums Division, Headquarters Marine Corps, report.

chest by sniper fire. Whereas the normal ratio of wounded is 3:1 or 4:1, this was reversed in the Grozny city fighting where three were killed for every wounded.”<sup>49</sup> In Grozny snipers not only contributed to the increased in the KIA:MIA ratio directly, they also contributed indirectly by hampering medical evacuation. Frequently wounded could not be evacuated until nightfall.<sup>50</sup> In Operation Peace for Galilee, “Israeli casualties for the siege of Beirut equaled or were greater than those taken against the PLO in the entire war in the south. Indeed losses in besieging Beirut cost the Israeli Defense Force almost twenty-four of its dead and thirty-two percent of its wounded for the entire war.”<sup>51</sup>

Contributions to the Overall Casualty Numbers. The geographic asymmetry of urban warfare requires manpower to secure avenues of approach and lines of communication both above and below ground, manpower to clear and secure buildings, and manpower to garrison, that which has already been taken. Urban operations are manpower intensive. For instance, British military operations in Northern Ireland absorbed twenty to thirty percent of all the infantry battalions in the British Army.<sup>52</sup>

Sometimes referred to as the urban canyon, cities, by nature, channelize the attacking force. And, where troops are concentrated, an opportunity for the enemy to inflict multiple casualties presents itself. Urban geography compels attackers to increase attacker to defender ratios and frustrates the ability of commanders to disperse troops in order to counter the effects of increased lethality. This puts not one or two Marines at risk in close quarters, but fire teams, squads, and platoons. While the normal attacker to

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<sup>49</sup> Grau and Kipp, “Soft Log” 7.

<sup>50</sup> Grau and Kipp, “Soft Log” 7.

<sup>51</sup> MCIA Beirut 2,3.

<sup>52</sup> United States, Urban Warfare: Lessons Learned Belfast 1969-76 (Pre-Publication Draft) (Virginia: MCIA, 1997) 9.

defender ratio is 3:1, “Russian doctrine called for a 6:1 advantage in personnel for urban combat. In Grozny, some 60,000 Russians battled 12,000 Chechens at an attacker to defender ratio of 5:1. The Russian found the 5:1 advantage was not enough.”<sup>53</sup> Whereas frontline troops bear the brunt of casualties in conventional warfare, see Figure 1-3, urban warfare forces the feeding of smaller units into narrow fronts.

<b>Relationship of Unit Size to Causality Rates</b>		
<b><u>Unit</u></b>	<b><u>Approximate Strength</u></b>	<b><u>Average Casualty Daily Engagement Rates Percent</u></b>
Company	200	21.0 (est)
BATTALION	800	9.5
Regiment	3,000	2.6
Division	15,000	1.0
Corps (3 Divs)	65,000	0.6
Corps (4 Divs)	90,000	0.4
Army (3 Corps)	250,000	0.3

Figure 1-3<sup>54</sup>

In addition to the concentration of troops, weapons and tactics employed by the urban defender also contribute to the higher number of casualties. Medical planners must take into consideration that weapons not known to be in the enemy’s inventory, may in fact make an appearance on the battlefield.

Weapons favored by both sides in urban warfare are snipers, fragmentation producing devices, and impact weapons, snipers having already been discussed above. Fragmentation devices--grenades, mortars, and homemade devices--take full advantage of concentrated forces and aim at producing multiple casualties and shock. Even if it is

<sup>53</sup> Grau and Kipp, Confronting the Specter 8.



presumed that the defender does not have fragmentation weapons in his inventory, history shows us that he will acquire them. In Belfast the Irish Republican Army (IRA) employed 16 models of homemade mortar over the course of the conflict, with ranges of 80-300 yards.<sup>55</sup> Additionally, Libya and Iran provided aid to the IRA--Libya provided 130 tons of weapons between 1985 and 1987!<sup>56</sup> Impact weapons include such items anti-aircraft guns employed against ground troops in a direct fire mode. Impact weapons, while used to kill your adversary, also serve the larger purpose on the urban battlefield by creating shock. Impact weapons, such as the DSH armor-piercing machine gun supplied by Libya to the IRA,<sup>57</sup> penetrate nearly any cover available on the urban battlefield and inflict horrific wounds. Horizontally fired mortars, rockets, and direct fire artillery are other common impact weapons that may be encountered.

Like multiple casualty weapons, tactics favored by urban defenders include tactics that concentrate attacking troops or take advantage of troops already concentrated with the aim being the ability to produce maximum shock and casualties. The ambush, booby trap, mines, and remotely controlled mortar attack were the mainstay of IRA paramilitary attacks against British military force.<sup>58</sup> The mindset of the defender can also result in weapons that would rarely be found in the hands of conventional forces, such as homemade acid bombs. Finally, adding to the dynamic of casualties in urban warfare is the presence of noncombatants, “burn-out”, non-battle injuries, and disease.

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<sup>54</sup> Dupuy 42.

<sup>55</sup> MCIA, Beirut 16.

<sup>56</sup> MCIA, Beirut 3.

<sup>57</sup> MCIA, Beirut 3.

<sup>58</sup> MCIA, Beirut 13.

When the Russians entered Grozny they were under the assumption that they would fight in a nearly “empty” city, with the bulk of the population having fled.<sup>59</sup> The Israelis, in 1982, also assumed civilians would act “rationally” and abandon areas where fighting was taking place.<sup>60</sup> Unfortunately, this is not the case. Many things motivate civilians to remain in the area. Motivations include not wanting their possessions looted by soldiers and concerns for their safety if they do leave. Israeli estimates indicate that their casualty rates, though high, would have been twenty percent higher had it not been for the use of individual protective vest (flak jacket).<sup>61</sup> Because civilians do not usually possess flak jackets or helmet, they can take tremendous casualties if caught in the middle of a firefight. The Russian Army, as the sole government representative, was expected to provide medical treatment to military as well as civilian casualties.<sup>62</sup> Today we can expect no less. If civilians are not cleared from the battlefield, a plan for dealing with civilian casualties should be thought out that keeps Echelon I care providers from having to deal with them extensively.

The tempo of urban warfare is higher than that of conventional warfare. Troops are called on to do all the conventional things well, but are also required to make split second, life or death decisions, as to friend or foe, noncombatant, and hostile intent. Furthermore, there is a certain anxiety fighting in complex ground where the chances of death from fratricide, a booby trap, ambush, or an unseen sniper are high. Troops also have to contend with added harassment like insults and verbal abuse from non-combatants. In Grozny, about seventy-eight percent of soldiers surveyed had some type

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<sup>59</sup> Grau and Kipp, “Soft Log” 1.

<sup>60</sup> MCIA, Beirut 6.

<sup>61</sup> MCIA, Beirut 11.

<sup>62</sup> Grau and Kipp, “Soft Log” 1.

of psychological disorder.<sup>63</sup> Twenty-six percent exhibited psychotic reactions such as high anxiety or aggressiveness, and a deterioration of moral values or interpersonal relations, excitement, or acute depression.<sup>64</sup> Forty percent demonstrated a lack of neuro-psychological stability that had a direct correlation to how long the soldier had been stationed in the frontlines.<sup>65</sup> The Russians applied lessons learned in Grozny to later counter-terrorist operations in North Caucasus. In the North Caucasus thirty percent of military personnel were rotated to rest and recreation areas where they could receive a medical check-up, wash, rest, and inspect (mend, repair) their clothes, equipment and vehicles.<sup>66</sup> Like the Russians, the British in Belfast also rotated personnel every four months on-station and allowed individual soldiers one four-day rest and recreation leave per tour.<sup>67</sup>

The other two categories of casualties common in urban warfare are disease and non-battle injuries. In Grozny, Russian soldiers frequently lacked clean drinking water, clean clothing, hot rations, and washing facilities. Personnel suffered from viral hepatitis, cholera, shigellosis, enterocolitis, diphtheria, malignant anthrax and plague.<sup>68</sup> “One combat brigade had 240 simultaneous cases of viral hepatitis.”<sup>69</sup> In the 1945 battle for Okinawa, there was a significant rise in disease in correlation to a rise in KIAs and MIAs, however, by Viet Nam, disease rates were not significantly higher than those involved in normal combat operations.<sup>70</sup> The difference between disease rates in Grozny and

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<sup>63</sup> Grau and Kipp, “Soft Log” 7.

<sup>64</sup> Grau and Kipp, “Soft Log” 7.

<sup>65</sup> Grau and Kipp, “Soft Log” 7.

<sup>66</sup> Issakov and Chizh, Press Conference 4.

<sup>67</sup> MCIA, Belfast 7.

<sup>68</sup> Grau and Kipp, “Soft Log” 7.

<sup>69</sup> Grau and Kipp, “Soft Log” 7.

<sup>70</sup> Christopher G. Blood and Marlisa E. Anderson, The Battle for Hue: Casualty and Disease Rates during Urban Warfare (California: Naval Health Research Center 1993) 11.

Okinawa, and those experienced in Viet Nam, can be attributed to effective management of disease. Non-battle injuries, twisted ankles, breaks, burns, etc. may also be higher in urban conflict, but research in these areas is not clear on the subject and tends to lump disease and non-battle injury statistics together.

## ENGINEERING AND SERVICES

In the MCIA lessons learned only one item each related to the logistical functional areas of engineering and services.

As stated earlier, engineering as a functional area relates to deliberate engineering, not combat engineering. In Beirut, Belfast, and Grozny, there was an enormous increase in deliberate engineering for establishing sites to hold prisoners, detainees, and refugees, but little increase in deliberate engineering that affected tactical units. At the small unit tactical level deliberate engineering is limited to the improvement of key terrain. In most instances key terrain in urban warfare will be major civilian structures (e.g. hospitals, churches, banks, embassies), which occupy tactically useful locations, command key intersections, and/or are built of especially solid construction. In these instances engineers can be used to enhance the building for friendly use, deny these key buildings to the enemy (e.g. demolitions), or make their use cost intensive to the enemy (e.g. barricades and obstacles). Of course this is not a consideration for operations in areas where buildings of this quality of construction do not exist.

The need for increased services, on the other hand, only increased if units were being rotated out of frontline position as they were in Northern Ireland and the Northern Caucasus.<sup>71</sup> In the Northern Caucasus, with little infrastructure with which to use, troops were rotated to small rest and recreation bases where troops could have a medical check up, wash, rest, sleep and inspect and repair clothes and equipment. These rest and recreation could be small villages or safes areas away from the fighting. Russians based

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<sup>71</sup> The Russians began the rotation of personnel in operations in Northern Caucasus based on lessons learned in Grozny.

rotations on studies conducted during World War II that showed human beings require extensive rest every thirty to forty days.<sup>72</sup>

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<sup>72</sup> Issakov and Chizh, Press Conference 4.

## **CONCLUSIONS AND RECOMMENDATIONS**

So, what are the unique logistics requirements of urban warfare? And, what are the logistics capabilities needed to support those unique requirements? First, consider the urban battlespace, it is a harsh, austere, environment that chews up men and material. The environment favors the defender. If the urban environment cannot be changed, combat service support units can be better organized. Additionally, because a clearly delineated front may not be possible in urban warfare, control measures should be examined that reduce combat service support casualties. With a minimum investment in personnel and equipment, the enemy can control “terrain” along lines of communication and that “terrain” may be one floor of a multistory building. Moreover, the enemy can reappear in areas deemed “cleared”. Regarding the resupply of combat forces, it is in the enemy’s best interest to force the attacker to choose between expending more effort in protecting lines of communication or accepting vulnerability to ambush and interdiction. Either way the enemy wins.

Instead of settling, as did the Russians and Israelis, by letting the enemy define “no mans land” by destroying “soft” transportation assets until the cost became prohibitive, Marine forces should clearly separate combat service support units from unit-level combat service support units. Restricted vehicle movement areas should be identified early in the operation and movement within that area should be restricted to transportation assets that are sufficiently hardened or protected by dismounted troops. Combat service support units should be prohibited from entering these restricted vehicle movement areas without authorization. Marine infantry battalions, which have organic logistics personnel, should be equipped with assets to allow for the quick and easy

transfer of sustainment, outside of the restricted vehicle movement area, from the combat service support unit assets to battalion assets. Front line forces should not have to provide combat assets for combat service support unit missions, to do so results in the inefficient use of limited assets. Although a viable mission for a unit designated as the battalion reserve could be protection of the unit-level combat service support unit, where the unit-level combat service support unit moves under a protective “bubble” in conjunction with the reserve, movements of both units would have to be compatible to minimize any additional investment of combat power. Using hardened vehicles to make the connection between combat service support areas (where the bulk of supplies are located) and front troops wastes fuel (limited cargo space of hardened assets requires more lift and more loads) or worse, escort troops. If movement within restricted vehicle movement areas is limited to unit-level personnel and assets, which already have a close working relationship to supported troops, the risk of fratricide is also reduced. Conclusions drawn from earlier discussion identify the logistics requirements for urban warfare as:

Supply System Capable of:

- ❖ Self-sustainment.
- ❖ Handling the constants: food, water, and fuel.
- ❖ Outfitting Marines properly for urban operations before deployment into the area of operations.
- ❖ Anticipating special equipment needs.
- ❖ Building and maintaining supply databases that help planners anticipate high demand item requirements.

Transportation System Capable of:



- ❖ Providing transportation of sustainment to frontline troops, but one that does not rob frontline commanders of assets.
- ❖ Having the right vehicles for the right support mission. (Soft vehicles to do heavy transport that possess the capability to transfer loads to an armored logistics vehicle that can take sustainment forward, small armored fuel trucks, armored ambulances, and small cheap load bearing vehicles to relieve frontline troops of weight).
- ❖ Protecting drivers in the urban environment, while at the same time providing better visibility.

#### Health Services Capable of:

- ❖ Understanding the dynamics involved in urban warfare.
- ❖ Predicting casualty rates and adjusting those predictions based on urban terrain and threat.
- ❖ Recovering casualties forward (this includes recovery teams with armored ambulances and casualty recovery teams equipped with heavy personal protection to recover casualties covered by sniper small arms fire).
- ❖ Limiting casualties by better personal protective equipment, rotation of personnel to prevent burnout, and enforcement of proper hygiene.

#### Engineering Services Capable of:

- ❖ Reinforcing key terrain (usually buildings) and/or denying access to the enemy.

#### Services Capable of:

- ❖ Responding to needs of urban combatants rotating off the frontline.

These conclusions are by no means definitive when talking about future operations. In some instances new capabilities will breed new requirements. A new supply constant in the future, in addition to food, water, and fuel, may be batteries, or

some other electricity-producing source. The requirement for batteries to support communications assets, night vision equipment, hand-held global positioning systems, thermal sights, weapons systems, and diagnostic maintenance equipment is daunting. Better, longer lasting batteries continue to be developed, but the capabilities of assets that rely on them have also increased, thereby negating some of the advances. Today, battery requirements for a typical combined arms exercise can easily equal one third of an infantry battalion's total exercise budget. During Urban Warrior, battery usage was not tracked and to do so would have had questionable value. Urban Warrior extensively used rechargeable batteries. Also, consider that developments in tactics and technology affect logistics. Tactics and technologies that reduce casualties and required supplies also result in fewer lift requirements. Finally, a responsive logistics system requires a communication system capable of linking the Marine in need with the combat service support system. A capable communications system is recognized as an absolutely critical requirement, but discussion of this topic would be too extensive to address in this paper.

## MARINE CORPS SOLUTIONS

Given the unique logistics requirements identified above, what is the Marine Corps' Strategy for the 21<sup>st</sup> Century? According to the Commandant of the Marine Corps, "Opportunities and challenges in the world's littoral regions will increase America's reliance on the continuous forward presence and sustainable maritime power projection of Naval expeditionary forces."<sup>73</sup> The concept for maritime power projection of Naval expeditionary forces is Operational Maneuver From the Sea (OMFTS), the Navy and Marine Corps' common vision for the future employment of forces. This common vision sees a chaotic world characterized by a breakdown of world order. The breakdown of world order will result in increased conflicts in the littoral regions and an increased risk of chemical, biological, radiological, and nuclear device use by regional powers or non-state actors.<sup>74</sup> The shift from a conventional concept to OMFTS in regards to logistics is a shift from supply build up ashore to sea-based logistics for support of the landing force. Forces sustained from maritime power are in stark contrast to sustainment of combat operations in Beirut, Belfast, and Grozny. In those operations, logistics bases were in relatively close proximity to supported combat operations. Additionally, lines of communication afforded those operations good road and rail networks. Naval forces sustained from maritime platforms will not have this luxury. To complicate matters further, reliance on host nation support in the future might not be an option. Depending on the situation and mission, fuel may not be compatible; infrastructure (electrical power plants, water pumping systems, etc.), may either be a

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<sup>73</sup> United States Marine Corps, Marine Corps Strategy 21 (Washington, D.C.: Headquarters Marine Corps, 2000) 2.

<sup>74</sup> United States Marine Corps, Operational Maneuver From the Sea (Washington, D.C.: Headquarters Marine Corps, 1996)

casualty of urban decay or deliberately sabotaged by the enemy; and there simply may not be enough resources to support both military operations and basic non-combatant life support.

To answer some of these questions the Marine Corps established the Marine Corps Warfighting Laboratory (Warfighting Lab) in 1995. The Warfighting Lab was tasked with assessing the future context of urban warfare, and through experimentation, identifying concepts for employing Marine forces in that environment. The Warfighting Lab developed its initial three-phase, five-year experimentation plan 1996. The first phase, Hunter Warrior, examined operations on dispersed, non-contiguous battlespaces similar to those encountered in the Persian Gulf War. The second phase, Urban Warrior, examined tactics, techniques, procedures and emerging technologies that might be used in urban environments.<sup>75</sup> Three limited objective experiments, a culminating phase experiment, two limited technical assessments and an advanced warfighting experiment were part of Urban Warrior. The Urban Warrior experiments culminated in a sea-based assault into what was formerly the Oak Knoll Naval Hospital Complex, Oakland, California, in March of 1999. Capable Warrior followed it. Capable Warrior focuses on expeditionary operations in the littorals and examines some of the challenges associated with Operational Maneuver from the Sea (OMFTS). Capable Warrior will conclude in June 2001.

The *Warrior* series of experiments were aimed at identifying essential capabilities required to meet the Marine Corps' four core competencies. All experimental projects and activities address at least one of these core competencies and Urban Warrior addressed Military Operations in Urban Terrain (MOUT). As stated on the Warfighting

Lab's home page, "The urban environment is the most-likely battlefield in the near future. Developing means to deal with this unique environment is essential."

At the conclusion of Urban Warrior, the Warfighting Lab produced a comprehensive Reconstruction and Analysis Report reflecting the observations of MCWL analysts. The analysts reviewed post-training data and feedback from Marines who participated in the experiment. Concurrent with the compilation of data for, and publication of, the Reconstruction and Analysis Report, the Warfighting Laboratory also produced a series of pocket-sized booklets based on the same observations. The booklets are referred to as the "X-Files". Information available in the X-Files is intended to convey a synthesis of lessons learned from all of the amphibious warfare experiments and conveniently flags those lessons learned specifically from Urban Warrior--they do not however, include lessons identified by MCIA. Although the MCIA lessons learned were originally published in draft form in 1997, there is no indication that the lessons identified were applied or acknowledged by the Warfighting Lab. The lessons identified in the X-Files are intended to be refined, as required, and inserted into the Marine Corps Combat Development System when all Urban Warrior experiments conclude.<sup>76</sup> The Warfighting Lab does not intend them to be doctrine, nor standing operating procedures. The information published in the X- Files is intended to be refined during Project Metropolis, a subset of the next experiments named Capable Warrior. The X-File dealing with logistics is 3-35.12, titled "Urban Sustainability". Taken together these two documents provide current Marine Corps progress to date.

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<sup>75</sup> Engineering services and services were not part of the experiment.

<sup>76</sup> United States Marine Corps, Urban Warrior Advanced Warfighting Experiment (AWE) 12-18 March 1999: Reconstruction and Analysis Report (Quantico, Virginia: Marine Corps Warfighting Laboratory, Marine Corps Combat Development Command, 1999)

In “Urban Sustainability”, the Commanding General of the Marine Corps Combat Development Command is quoted as charging the *marine air ground task force (MAGTF) combat service support elements, as well as, unit-level combat service support organizations “with being able to locate and reach dispersed elements of supported units in “vertical” urban terrain.”*<sup>77</sup>

Unfortunately, Urban Warrior’s focus on combat service support deviated from the Commanding General, Marine Corps Combat Development Command’s guidance and from lessons learned by the Israelis, British, and Russians. Urban Warrior focused entirely on the combat service support element and not unit-level combat service support. In the countries studied, the breakdown in support occurred, not with what can be equated to the combat service support element, but at the division between the combat service support and unit-level combats service support elements. The Russians were highly effective in getting combat service support *close* to where it needed to go, but failed to make the final connection to the supported unit.

In Urban Warrior the combat service support element was organized in a non-traditional way. It was formed and trained to use new and emerging technologies and to facilitate sea-based combat service support in an urban environment. The focus was on exploiting practical technologies, systems, and tactics, techniques and procedures, to improve command and control and distribution.<sup>78</sup> The combat service support unit was stood up under the name of Combat Service Support Element Enterprise, or “Enterprise”.

Unfortunately, during the Urban Warrior scenario, “Enterprise” was given an additional mission, that of providing humanitarian assistance/disaster relief. Although

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<sup>77</sup> This quote is cited as being taken from a document titled “A Concept for Future Military Operations on Urbanized Terrain.”

this mission is in keeping with missions that can be assigned to a Marine Expeditionary Unit, the combat service support element is just one element that can be assigned the humanitarian assistance/disaster relief mission. Evaluating Enterprise's performance of both missions was akin to evaluating an infantry battalion on both urban warfare and small boat operations—boat operations with an entirely new suite of boat equipment. Having Enterprise invest the majority of its time in planning and execution of the humanitarian assistance/disaster relief mission resulted in a poor evaluation of its combat service support missions.

A second misplaced undertaking was that Enterprise would use the new “practical technology” to provide combat service support all the way down to the infantry squad level. This was a departure from the Commanding General, MCCDC's original guidance in that the unit-level combat service support element was removed entirely from the picture.

Practical technology used by Enterprise included end user terminals (EUTs)<sup>79</sup> at the squad level, to initiate the combat service support request, and technologies to provide a delivery means. In order to do this, the non-traditional organization resulted in the establishment of a Mobile Combat Service Support Detachment (Mobile Det) with Direct Delivery Teams.

Enterprise's Combat Service Support Operations Center would receive a request from a squad via the EUT and forward it to the Mobile Det. The Mobile Det, in turn, would pass the request to a task-organized Direct Delivery Team, which would then,

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<sup>78</sup> Urban Warrior, Reconstruction and Analysis Report. D-2.

<sup>79</sup> A small, portable, battery powered, laptop computer worn on the chest of the user.

link-up with the unit (squad) to provide the required support.<sup>80</sup> Direct delivery by means of a third party has serious implications that were not addressed in the Reconstruction and Operations Analysis Report or the X-Files. The effect of bypassing unit-level combat service support creates two problems. First, combat service support element personnel responding directly to a request from a squad leader, rules out the most effective method of distribution, redistribution. The chance that an adjacent squad or company has excess of what the squad needs is very likely. In any case, it is always the first resource exhausted. Secondly, unit-level combat service support personnel, by proximity, are more in tune with the battle rhythm and have a closer working relationship with their own people. They know who can afford to give up excess based on current and future operations. They also know what routes are clear or can be cleared for delivery and can deconflict fires along the routes of ingress with friendly units. The additional benefit of identifying erroneous requests early benefits high operational tempo. Given that there is higher incidence of fratricide in urban warfare, a direct delivery team passing through another friendly unit's area, or passing unknowingly through enemy held areas without deconflicting routes only adds to friction and the potential for fratricide. The following paragraphs speak to observations cited in the Reconstruction and Analysis Report of how Enterprise/Urban Warrior addressed the conclusions reached in the previous section.

Supply System. During Urban Warrior, the initial plan was to land the Mobile Det ashore with one day of ammunition and one day of supply. At the end of each day, Enterprise planned to resupply the Mobile Det by helicopter, as required, to maintain its

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<sup>80</sup> The Mobile Det was originally to provide self-protection and protection to any direct delivery teams sent out by vehicles provided by the GCE. This augmentation was scaled back prior to the landings at Oak Knoll.



supply stockpiles ashore. At night the new supplies were to be prepackaged into push-packs<sup>81</sup> by Mobile Det personnel for distribution to combat forces. Due to experimental constraints the Mobile Det saw limited action during Urban Warrior's tactical play. Only eight resupply missions were requested, due to poor connectivity and an unclear process in the absence of connectivity. Additionally, hearkening back to World War II amphibious operations, Enterprise, in the face of dwindling transportation, was forced to estimate requirements for the entire experiment and bring those items ashore at the beginning of the exercise. Although the basis for the new organization was to trade inventory ashore for more ship-to-shore transportation, canceled air assets and lack of surface assets, forced this decision upon the Enterprise commander who still had the responsibility for support regardless of transportation availability. The majority of items issued were food, bottled water, and small arms. Refueling operations were not permitted during the experiment because of environmental concerns. The supply system did provide for the proper outfitting of Marines prior to deployment. Finally, the ability of the supply system to anticipate special equipment needs wasn't exercised because special equipment that did not go ashore in the first wave (e.g. grenades, smoke, and the Shoulder Mounted Assault Weapon (SMAW) simulators), could not make it ashore later due to lift constraints.

Transportation System. Because the basis for the new organization was to trade inventory ashore for more frequent ship-to-shore transportation, the Warfighting Lab had Enterprise evaluate several forms of experimental transportation. These included small Avon rubber boats, the Broad Area Unmanned Responsive Resupply Operations

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<sup>81</sup> An anticipatory prepackaged supply pack containing one squad's amount of food, water, and ammunition.

(BURRO) aircraft prototype, and Flyer, Gator, and Grizzly experimental wheeled vehicles. The Avon is a small rubber boat equivalent in size to the combat rubber raider craft currently used by infantry boat companies. The BURRO is an external lift helicopter capable of carrying 6,000 pounds of supplies in four independently detachable loads—in its final version this vehicle will be unmanned. The Flyer is a diesel powered, roughly HMMWV sized vehicle, with improved suspension and handling capabilities. The Flyer's upper frame folds to allow another Flyer vehicle to be stacked on top. This doubles the number of vehicles that can fit aboard a landing craft air cushion or landing craft utility. The Gator looks like a six-wheeled garden tractor that has a small cargo bed in the rear. The Grizzly is a four-wheeled all terrain vehicle. The criteria used for choosing these vehicles is not apparent, however, they were divided by missions as follows: the Avon rubber boats and BURRO were to provide a link between ship and Mobile Det ashore, while the Flyer, Gator, and Grizzly provided a link between the Mobile Det and unit, by way of the direct distribution teams.

Ship-to-Shore. Observations made in Reconstruction and Analysis Report indicate that the Avon was impractical for immediate resupply because of its inability to operate in a rough sea state, the requirement to waterproof all cargo, long lead times to prepare the ship for small boat operations (ballasting down), and its launching limitations while the ship was underway. The BURRO, on the other hand, offered some definite advantages to the urban warrior. The BURRO is highly mobile in the urban environment, can resupply via any rooftop, can transfer cargo to other sources of transportation, can lift a substantial payload, and is relatively cheap. The loss of the BURRO, because it is unmanned, would have little impact on unit moral.

Mobile Det to Unit. The Flyer, Gator, and Grizzly are not the right vehicles to support the mission of unit delivery. Although the X-Files state that the Urban Warrior experiments confirmed the tactical utility of prepackaged supplies delivered by fast, agile vehicles, history would disagree. These vehicles need armor. Additionally, the X-Files state that, “combat service support units were most effective when attached to infantry units for force protection.”<sup>82</sup> Again this draws combat power away from the frontline commander. Neither the Flyer, Gator, or Grizzly provide protection to the vehicle operator. These vehicles do not have the ability to transfer their loads and can handle only light payloads (under 2000 lbs). Based on earlier conclusions they are the wrong vehicles to be evaluated for this role. The Gator, however, with its ease of operation, low cost, and small cargo bed, is a good candidate for a load-bearing vehicle to be held at the platoon or squad level.

Health Services. The Reconstruction and Operations Analysis Report and X-Files demonstrate some understanding of the casualty dynamics involved in urban warfare, however, these were not addressed at the combat service support level. Instead the health services support detachment operated at the humanitarian assistance/disaster relief site. Of note is the fact that one of the tactical issues examined included reorganization of the infantry squad and better personal protective equipment to reduce casualties. While the better personal protective equipment reduced injuries caused by abrasions, etc., casualty rates were unchanged.

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<sup>82</sup> United States Marine Corps, Urban Sustainability: Military Operations in Urban Terrain (MOUT) (Quantico, Virginia: Marine Corps Warfighting Laboratory, Marine Corps Combat Development Command 1999)

## RECOMMENDATIONS

If trends toward urbanization of the littorals continue, and the Marine Corps is committed to ensuring forward afloat forces can respond to a crisis there, the Marine Corps must recognize what factors contribute to urban warfare's unique character and what logistics requirements and capabilities are needed. Actions taken by the Marine Corps' Warfighting Lab to identify tactics, techniques, procedures, and technology that maximize the effects of smaller forces in the urban combat are steps in the right direction. Logistics to support operations in urban warfare, however, must meet today's challenges and remain flexible enough to adapt to tomorrow's changes. To adapt, the Marine Corps must monitor and evaluate lessons learned in recent urban conflicts and new ones as they occur. If changes in Marine Corps tactics, techniques, procedures, and technology cannot overcome the failures experienced by other nations (e.g. new tactics have no effect on casualty dynamics, consumption rates, requirements for transportation, etc.), the Marine Corps will have to reevaluate the effectiveness of current logistics organizations and their equipment. Evaluations must include not only combat service support elements, but unit-level combat service support organizations as well. Evaluations must be realistic.

To aid in focusing its effort, the Marine Corps should consult the scientific community to establish helpful parameters. If the majority of replenishment missions and transportation assets are used to move fuel, how long we will be dependent on fossil fuels? What is the next step in vehicle power sources, and when will the next step occur? Additionally, what is the expected service life of the Marine Corps' developmental projects, like the advanced amphibious assault vehicle and V-22 Osprey? These systems

are dependent on fossil fuels. If a suitable replacement for fossil fuels cannot be envisioned in the next fifteen to twenty years, and we must support combat systems being developed today for the same amount of time, we should refuse the inclination to wish support of these items away with terms like “host nation support” and unrealistic concepts such as “urban foraging”.<sup>83</sup> These concepts assume that these commodities will be available in any theater. Recent military examples do not support these concepts. Realistically, planners should assume that theater urban infrastructure can no longer provide a resource for these items, and that if they are available they are either tainted or require further refinement.

Once we have determined what we cannot change, identify logistics requirements and capabilities that will enhance combat forces. Recent examples in Beirut, Belfast, and Grozny, identify a need to focus on the functional areas of supply, transportation, and casualty prevention and evacuation. Transportation systems that do not depend on depriving the front-line commanders of combat assets, or personnel, benefit forces as a whole. We should develop specialized transportation systems to meet the specialized needs of urban combat service support. These systems could be armored ambulances and refuelers, or could be cost effective unmanned aerial vehicles. These systems should then be matched to appropriate combat service support organizations and missions.

Finally, if tactics, technology, or procedures for combat service support of urban combat operations can be improved, improvements should be tested against realistic scenarios that assay the constraints of sea-based logistics and replicate the competition among units for suitable delivery platforms.

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<sup>83</sup> Urban Sustainability 21.

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